

THE EVOLUTIONARY FORCE OF A WIDE RANGE

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(It is with considerable hesitation that I offer this paper on a subject that is somewhat out of my usual line. I do so on the advice of my friend, Dr. Joseph Grinnell, of Berkeley, California, as he assures me it will be found new and important, and that I should certainly put it on record.)

In 1892, I corresponded with a Russian naturalist, Baron Max von Sivers, of Roemershof, Riga, Livonia, who represented a group that intended to introduce the wild turkey into Livonia. Though in sympathy with their purpose, I took a pessimistic view of its feasibility, and, in a brief paper, pointed out a principle involved that seems nearly self-evident when one arrays the available facts.

This principle I have often referred to in my writings since, and elaborated in my lectures, but have not hitherto offered for record in formal scientific print. Therefore I now reproduce that paper.

The theory is briefly this: *Other things equal, a species evolved in a large area, is stronger than one evolved in a small area.* Obviously, the chances of superior variants appearing are greater in a large population than in a small one. And further, a race that can adapt itself to the many vicissitudes of a large range is stronger than one that is fitted to the less vicissitudes of a more limited space. Evidently a big fire is hotter in the middle than a little fire.

The largest existing land-area, for a species that can freely traverse mountains and rivers, is Eurasia. Therefore, if my theory be right, a Eurasian species will speedily overcome an American species, or an Australian species. Witness the triumphant march of the house-sparrow, the starling, the brown rat, the house-mouse, the mongoose, the fruitbat, the carp, the brown trout, the browntail and the gypymoths, etc., many weeds and even trees.

These, being Eurasian, have been specialized in so many ways, and hardened in so many more fires and forces than our own kindred species, that they are stronger, hardier, more adaptive, less subject to disease, more resistant, more aggressive, more frugal, more prolific. And they march ever on, possessing and destroying, even as the white man himself has done. Significant illustration is seen in the facts that the Asiatic chestnut is immune to the blight that is destroying the American, and the Caucasian pine is proof against the blister-rust that is filling American foresters with dismay.

All attempts to implant our ruffed grouse in the old world have been utter failures; on the other hand the Hungarian partridge and the Mongolian pheasants are immediately successful here.

Not only is a species of Eurasian evolution stronger than one of American; but an American is stronger than an Australian; an Australian is stronger than a New Zealander; and an African is stronger than a Madagascan species. Indeed, a continental species always is stronger and bigger than an insular form; and creatures evolved in small islands wither away before the invading Eurasians like pine boughs in a flame. For example, note the dodo of the Mauritius, and the ground-pigeon of Samoa, and possibly also our own wild pigeon.

It seems to be nearly self-evident that all of the dominating land animals in North America today are of species that have close kin, and apparently their parent stock, in Eurasia. They probably invaded this area by way of the northwest land-bridge; for example, the coyote, gray-wolf, fox, mountain-sheep, moose, white bear, otter, weasel. And the species that cannot hold their own, as attested by paleontology, were those evolved in this region.

It is pretty well established that as a rule species increase in size as they evolve, and are at their maximum when their race disappears, i.e., great size is proof that they have gone far along the trail.

This rule is evidenced by the fact that the recent or living American cats, camels, horse, sheep, bison, wild hogs, horned owl, ostrich, etc., are smaller than those of the older, bigger world.

If however the giant fox of South America is of the genus *Vulpes*, then it is an exception to the rule I am trying to formulate. If it is obviously of another genus, it is not an exception, and further foreshadows with certainty the finding of extinct giant foxes in Eurasia. The same remarks and prophecy apply to the condor and the harpy eagle.

If we compare the gerboas of Africa with the nearly parallel kangaroo-rats of America, we find that the former, with their wide range, have gone much further in evolution than the latter with their limited range. I doubt not that a few thousand African gerboas released in our southwest would, by mere pressure of better equipment, drive all our dipodomys to extinction, and possess their range.

Conversely, no American species has ever been able to establish itself in Eurasia, no Australian species has ever conquered Eurasia or America, no New Zealand species has ever successfully invaded

Australia, no species of Madagascan evolution, has ever established itself in Africa.

My sad contention, then, to my Russian friends, was that the American wild turkey would stand no chance of success if introduced into a Eurasian environment, to compete with the highly equipped native species.

As apparent exceptions one recalls the canal weed, (*Philotria canadensis*), an American species running riot in England; the water hyacinth of South America becoming a nuisance in Florida; maybe also the muskrat which is said to be possessing parts of Europe.

I suppose that the answer is that the rival species these invaders must combat in their new homes, were evolved in small, isolated sections of their larger motherland, in some way hedged about by an impassable barrier. They had not really a continent-wide dispersal, so were not subject to the urge of a wide environment, and, therefore, are not exceptions to the principle of the law.

The great land centre of evolution is Eurasia, and it will continue to turn out the successful species, as long as it continues to be the greatest unbroken land area, a thought that is not without its measure of warning to the human species, when one recalls that, in a rigid application of this law, the Oriental races are bound to inherit the earth.

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